NOAA Technical Report NOS 85 NGS 16


# The Bruns Transformation and a Dual Setup of Geodetic Observational Equations

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**U.S. DEPARTMENT OF COMMERCE**
**National Oceanic and Atmospheric Administration**
National Ocean Survey

(Continued)

NOAA Technical Reports, NOS/NGS subseries

NOS 65 NGS 1 The statistics of residuals and the detection of outliers. Allen J. Pope, May 1976, 133 pp (PB258428). A criterion for rejection of bad geodetic data is derived on the basis of residuals from a simultaneous least-squares adjustment. Subroutine TAURE is included.

NOS 66 NGS 2 Effect of Geoceiver observations upon the classical triangulation network. R. E. Moose and S. W. Henriksen, June 1976, 65 pp (PB260921). The use of Geoceiver observations is investigated as a means of improving triangulation network adjustment results.

NOS 67 NGS 3 Algorithms for computing the geopotential using a simple-layer density model. Foster Morrison, March 1977, 41 pp (PB266967). Several algorithms are developed for computing with high accuracy the gravitational attraction of a simple-density layer at arbitrary altitudes. Computer program is included.

NOS 68 NGS 4 Test results of first-order class III leveling. Charles T. Whalen and Emery Balazs, November 1976, 30 pp (GPO# 003-017-00393-1) (PB265421). Specifications for releveling the National vertical control net were tested and the results published.

NOS 70 NGS 5 Selenocentric geodetic reference system. Frederick J. Doyle, Atef A. Elassal, and James R. Lucas, February 1977, 53 pp (PB266046). Reference system was established by simultaneous adjustment of 1,233 metric-camera photographs of the lunar surface from which 2,662 terrain points were positioned.

NOS 71 NGS 6 Application of digital filtering to satellite geodesy. C. C. Goad, May 1977, 73 pp (PB-270192). Variations in the orbit of GEOS-3 were analyzed for $M_2$ tidal harmonic coefficient values that perturb the orbits of artificial satellites and the Moon.

NOS 72 NGS 7 Systems for the determination of polar motion. Soren W. Henriksen, May 1977, 55 pp (PB274698). Methods for determining polar motion are described and their advantages and disadvantages compared.

NOS 73 NGS 8 Control leveling. Charles T. Whalen, May 1978, 23 pp (GPO# 003-017-00422-8) (PB286838). The history of the National network of geodetic control, from its origin in 1878, is presented in addition to the latest observational and computational procedures.

NOS 74 NGS 9 Survey of the McDonald Observatory radial line scheme by relative lateration techniques. William E. Carter and T. Vincenty, June 1978, 33 pp (PB287427). Results of experimental application of the "ratio method" of electromagnetic distance measurements are given for high resolution crustal deformation studies in the vicinity of the McDonald Lunar Laser Ranging and Harvard Radio Astronomy Stations.

NOS 75 NGS 10 An algorithm to compute the eigenvectors of a symmetric matrix. E. Schmid, August 1978, 5 pp (PB287923). Method describes computations for eigenvalues and eigenvectors of a symmetric matrix.

NOS 76 NGS 11 The application of multiquadric equations and point mass anomaly models to crustal movement studies. Rolland L. Hardy, November 1978, 63 pp (PB293544). Multiquadric equations, both harmonic and nonharmonic, are suitable as geometric prediction functions for surface deformation and have potentiality for usage in analysis of subsurface mass redistribution associated with crustal movements.

NOS 79 NGS 12 Optimization of horizontal control networks by nonlinear programing. Dennis G. Milbert, August 1979, 44 pp (PB80 117948). Several horizontal geodetic control networks are optimized at minimum cost while maintaining desired accuracy standards.

NOS 82 NGS 13 Feasibility study of the conjugate gradient method for solving large sparse equation sets. Lothar Gründig, February 1980, 22 pp. Method is suitable for constrained adjustments of triangulation networks but not for free adjustments.

NOS 83 NGS 14 Tidal corrections to geodetic quantities. Petr Vaníček, February 1980, 30 pp. Corrections for tidal force are formulated and tidal aspects relating to geodesy are discussed.

NOS 84 NGS 15 Application of special variance estimators to geodesy. John D. Bossler and Robert H. Hanson, February 1980. Special variance estimators, one involving the use of noninteger degrees of freedom, are analyzed and applied to least-square adjustments of geodetic control networks to determine their effectiveness.

NOAA Manuals, NOS/NGS subseries

NOS NGS 1 Geodetic bench marks. Lt. Richard P. Floyd, September 1978, 56 pp (GPO# 003-017-00442-2) (PB296427). Reference guide provides specifications for highly stable bench marks, including chapters on installation procedures, vertical instability, and site selection considerations.

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